

Remarks/Argument

Claim Summary

By this Amendment, claims 1 and 11 have been amended, and no other claims have been added to or deleted from the application.

Accordingly, claims 1-37 remain pending in the application.

Restriction/Election

Without acquiescing to the reasoning underlying the election of species requirement, Applicants acknowledge that claims 12-20, 22 and 24-37 have been withdrawn from consideration.

However, since dependent claims 12-13, 15-17 depend directly or indirectly from claim 1, it is understood that these dependent claims would be allowed upon the eventual allowance of claim 1.

Specification

Applicants disagree that the specification contains “numerous grammatical errors”, and accordingly, Applicants traverse the objection to the disclosure and the requirement that that a substitute specification be submitted.

If the Examiner feels compelled to maintain the objection, Applicants respectfully request the Examiner’s assistance in identifying the alleged grammatical errors.

35 U.S.C. ¶112, second paragraph

By this Amendment, claim 11 has been revised to overcome the informality alleged by the Examiner.

35 U.S.C. ¶102

Claims 1, 3, 6-7 and 9-11 were rejected under 35 U.S.C. ¶102 as being anticipated by Campbell et al. (US 4990229). Claims 1, 3, 7-8 and 10 were rejected under 35 U.S.C. ¶102 as being anticipated by Maeda et al. (EP 0676793). Claims 1, 2 and 10 were rejected under 35 U.S.C. ¶102 as being anticipated by Boswell (US 4810935).

Applicants respectfully traverse these rejections with respect to the now-pending claims.

By this Amendment, claim 1 has been amended to clarify that the magnetic field production device is separate from the plasma inducing device, and that the magnetic field production device is positioned adjacent to the first chamber or between the first and second chambers.

Campbell et al discloses a classical helicon plasma generation source in which a specifically shaped antenna 32 operates in conjunction with magnets 33 and 34 to enable a high density plasma to be formed. Thus, devices 33 and 34 are part of the plasma inducing device, and are not magnetic field production devices separate from the plasma inducing device as required amended claim 1. Additionally, the device 36 of Campbell et al is part of a magnetic bucket arrangement associated with the second chamber, and therefore is outside of the scope of amended claim 1, which requires that the magnetic field production device to be position to act on the first chamber, not the second. The purpose of 33 and 34 is to enable the generation of helicon/whistler waves in order to form a very high density plasma having a high density of ions. The purpose of 36 is to provide a magnetic bucket in order to maximize the plasma density in the second chamber. Therefore, the purpose of 33, 34 and 36 in Campbell et al is to maximize the number of ions produced, rather than attenuate the ions as required by the present claims.

Similar comments apply with respect to Maeda et al. The solenoids 5 and 6 of Maeda et al are used to form a helicon wave for the purpose of creating the plasma.

Likewise, similar comments apply with respect to Boswell. The coil 13 is a device for generating whistler or helicon waves as a means of producing a high density plasma. The coil 16 acts as a magnetic bucket for the second chamber.

For at least the reasons stated above, Applicants respectfully contend that claim 1, and the claims dependent thereon, define over the cited references.

35 U.S.C. ¶103

Claims 2-9 and 11

Dependent claims 2-9 and 11 were variously rejected under 35 U.S.C. ¶103 as being unpatentable over Campbell et al. or Maeda et al. or Boswell, in combination with various secondary references cited by the Examiner at pages 6-15 of the Office Action. However, Applicants respectfully traverse these rejections for the same reasons as stated above in connection the rejections under 35 U.S.C. ¶102.

Claim 23

Claim 23 was variously rejected under 35 U.S.C. ¶103 as being unpatentable over Campbell et al. or Maeda et al. or Boswell, in combination with Wicker et al. (US 5863376).

Applicants respectfully submit that the combination of Wicker et al with any of Campbell et al. or Maeda et al. or Boswell would not produce an apparatus falling within the scope of claim 23. Wicker et al teaches the use of a window 20 formed from a high thermal activity dielectric material such as aluminium nitride. The window 20 is in contact with an antenna 18, and maximises heat transfer from

the antenna 18 through the window. Therefore, even if the skilled person were motivated to combine the teachings of Wicker et al with any one of Campbell et al, Maeda et al and Boswell (which is denied), this combination would result in an apparatus having first and second chambers and an aluminium nitride window in contact with an antenna. This hypothetical combination would not provide an apparatus according to present claim 23, in which the first chamber incorporates a dielectric plasma tube formed from aluminium nitride or silicon carbide or other dielectric material having a thermal conductivity sufficiently greater than aluminium oxide. There is no teaching or even suggestion in any of the cited documents that apparatus of the claimed type incorporating a dielectric plastic tube formed from aluminium nitride or silicon carbide or other dielectric material defined in claim 23 might be contemplated. Furthermore, the Applicant submits the apparatus described by present claim 23 in order to overcome a problem in which a high temperature grading can develop between the inside and outside of a dielectric tube because of a high flux of ions bombarding the inner wall surface of the tube near the antennae position. This bombardment warms up the inside of the tube, while the outside of the tube can remain relatively cool. It is possible that the inner wall temperature can rise rapidly while the outer wall temperature rises only slowly, resulting in a large temperature difference between the inside and outside wall of the tube which can lead to fracture. By forming the tube as claimed this problem can be overcome by reducing the temperature difference between the inner and outer walls of the tube. This is in contrast with Wicker et al, where the purpose of the aluminium nitride window is to “maximise heat transfer from the antenna” (column 6, lines 21 to 24). Therefore, both the problem and solution addressed by present claim 23 are different to the problem and solution addressed by Wicker et al.

In view of at least the above, Applicants respectfully contend that claim 23 defines over the cited references.

Conclusion

No other issues remaining, reconsideration and favorable action upon the present claims are requested.

Respectfully submitted,

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